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THE KENT INCORPORATED SOCIETY
FOR PROMOTING EXPERIMENTS IN
HORTICULTURE

ADMINISTRATIVE REPORT

(THIRTY-SEVENTH YEAR)

GENERAL DEVELOPMENT AND ACTIVITIES

EAST MALLING RESEARCH STATION

Near MAIDSTONE

KENT

1st January, 1949, to 30th September, 1949

Published March, 1950

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Appointed by the Staff Council of East Malling Research Station:

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STAFF

(1ST OCTOBER, 1949)

Director: F. R. TUBBS,* M.Sc.(Lond.), Ph.D.(Lond.), D.I.C., A.R.C.S., F.L.S. (*Appointed July*, 1949.)

Assistants to Director: T. N. HOBLYN,* Hort.Dip.(Wye).
E. E. CHEESMAN,* D.Sc.(Lond.), A.R.C.S. (*Resigned September*, 1949.)

Pomology:
W. S. ROGERS,* M.A.(Cantab.), D.Sc.(Lond.), Dip.Hort.(Cantab.), A.Inst.P.
Miss A. B. BEAKBANE, Ph.D.(Lond.), N.D.H.
N. H. GRUBB, M.S.A.(Cornell). (*Retired September*, 1949.)
R. J. GARNER, N.D.H., Dip.Hort.Sci.(Reading).
D. W. P. GREENHAM, M.A.(Cantab.).
H. M. TYDEMAN, *Plant Breeding.*
Miss E. M. GLENN, B.Sc.(Lond.), *Field Records.*
Miss I. MODLIBOWSKA, Ph.D.(Lond.).
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Miss J. M. PATON, Hort.Dip.(E. of Scotland), *Field Records.*
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Miss C. P. NICOLL, B.Sc.Hort.(Reading).
MISS N. WALLICK, B.S.A.(Brit. Columbia). (*Appointed April*, 1949.)
C. H. W. SLATER.

Assistants (Scientific):
Miss E. C. M. ASHDOWN.
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Miss S. J. COGGER.
Miss P. HARRIS.
Miss J. M. HAYWARD. (*Resigned February*, 1949.)
Miss F. M. HODGES.
Miss E. IRONMONGER. (*Appointed April*, 1949.)
A. E. H. RUTTER. (*Resigned July*, 1949.)
D. HOOPER. (*Appointed July*, 1949.)

Hops:
F. H. BEARD, Hort.Dip.(Wye). (*Resigned September*, 1949.)

Statistics:
T. N. HOBLYN.*
S. C. PEARCE, B.Sc.(Lond.).
J. TAYLOR, M.A.(Cantab.).
Miss J. M. S. THOM.

* Recognized Teacher of the University of London.
† Appointed under special grant from Agricultural Research Council.

Assistant (Scientific) :

Miss V. V. Fry. (*Appointed May,* 1949.)

Plant Physiology: M. C. Vyvyan,* M.A.(Cantab.), D.Sc.(Lond.).
Miss M. R. Rawes.
G. F. Trowell.

Assistants (Scientific) :

Miss J. G. Smith.
R. W. Love. (*Appointed September,* 1949.)

Members of Staff of the Imperial College of Science and Technology working in collaboration with Physiology Section :

E. S. J. Hatcher, Ph.D.(Bristol).
H. W. B. Barlow, B.Sc.(Edin.).
C. R. Hancock, B.Sc.(Bristol). (*Appointed October,* 1949.)
F. W. M. Llewelyn, B.Sc.(Lond.), A.R.C.S. (*Appointed October,* 1949.)

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J. H. Larking. (*Resigned February,* 1949.)
B. Barrett. (*Appointed April,* 1949.)
W. R. Marchant. (*Appointed October,* 1949.)

Biochemistry: W. A. Roach,* D.Sc.(Lond.), A.R.C.S., D.I.C., A.R.I.C.
A. E. Bradfield, D.Sc.(Wales), Ph.D., *Organic Chemist.*
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A. C. Mason, B.Sc.(Lond.), F.R.I.C., *Physical Chemist.*
F. H. Vanstone, Ph.D.(Wales), A.Inst.P., *Physicist.*
A. E. Flood, M.A.(Cantab.), Ph.D.(Manc.), *Organic Chemist.* (*Appointed March,* 1949.)
H. J. Philcox.
Miss A. V. Delap, B.A., B.Sc.(Dublin).

Special Assistant :

Miss M. E. Bunyard, A.R.R.C.

Assistants (Scientific) :

H. Hutchins.
Miss B. M. Kidwell.
Miss M. Saunders.
R. Neve.
E. C. Wills.
Miss F. M. Woolgar.
Miss A. J. White.
Miss M. M. Acott.
Miss C. M. Bennett.
Miss S. M. Lloyd. (*Appointed September,* 1949.)

Members of Staff of the Imperial College of Science and Technology working in collaboration with the Biochemistry Section :

B. D. Bolas,* D.Sc.(Lond.), D.I.C.
H. C. Ruck, B.Sc.Hort.(Reading). (*Appointed April,* 1949.)

Assistants (Scientific) :

Miss C. C. Macnamara.
Miss B. Milton.

Plant Pathology: R. V. HARRIS,* D.Sc.(Lond.), A.R.C.S., D.I.C.
M. H. MOORE, Ph.D.(Lond.), M.Sc., Dip.Hort.Sci.(Reading), *Plant Pathologist.*
W. G. KEYWORTH, Ph.D.(Lond.), A.R.C.S., D.I.C., *Plant Pathologist.*
A. F. POSNETTE, M.A.(Cantab.), A.I.C.T.A., *Virologist.* (*Appointed August*, 1949.)
P. C. R. WEBB, M.Sc.(Lond.), *Mycologist and Bacteriologist.* (*Resigned March*, 1949.)
J. PAINE, B.Sc.(Lond.), A.R.C.S., *Virologist.*
J. E. CROSSE, B.Sc.(Birmingham), *Mycologist and Bacteriologist.* (*Appointed April*, 1949.)
Miss M. BENNETT, B.Sc.Hort.(Lond.), Dip.Hort.(Swanley), *Field Trials ; also attached Entomology and Plant Protective Chemistry.*
P. J. ORMEROD, B.A.Agric.(Cantab.), *Field Trials, Hops.*
A. KOZLOWSKI, Ph.D.(Lwow), *Soilborne Diseases.* (*Appointed May*, 1949.)
Miss J. L. SMITH, B.Sc.(Glasgow).
D. S. KIRKHAM, B.Sc.(Lond.), *Bio-assay of Fungicides, attached to Plant Protective Chemistry.*
Miss M. M. HITCHCOCK, B.Sc.Hort.(Reading). (*Resigned February*, 1949.)
Miss P. M. GOODE, B.Sc.(Durham). (*Appointed May*, 1949.)
Miss T. WOOLLCOMBE, B.Sc.Hort.(Reading).† (*Resigned September*, 1949.)
R. CROPLEY, Dip.Hort.(Reading).† (*Appointed October*, 1949.)

Assistants (*Scientific*) :
R. D. SOUTER.
Miss B. I. FLEET.
Miss M. M. JOYCE.
Miss S. SQUIRES.

Entomology: A. M. MASSEE,* D.Sc.(Lond.), F.R.E.S.
G. H. L. DICKER, Ph.D.(Lond.), A.R.C.S.
M. D. AUSTIN, F.R.E.S., *Red Spider Investigations in Essex.*
R. S. PITCHER, Ph.D.(Lond.), *Strawberry Eelworm and Raspberry Cane Midge.*
K. S. MCKINLAY, B.Sc.(Lond.), *Bio-assay of Insecticides, attached to Plant Protective Chemistry.*
Miss E. COLLYER, B.Sc.(Lond.),† *Red Spider Investigations in Essex.*
Miss J. R. GROVES, B.Sc.Hort.(Reading).
F. CRONK. (*Resigned March*, 1949.)

Assistants (*Scientific*) :
E. F. SOUTER.
Miss H. MAY. (*Appointed June*, 1949.)

Plant Protective Chemistry: A. H. M. KIRBY, M.Sc.(Lond.), Ph.D.(Lond.), A.R.I.C.
Miss B. S. WINTON, B.A.(Cantab.).
M. ALLEN, B.Sc.(Lond.). (*Appointed July*, 1949.)
R. G. GAMBRILL.
L. J. PULESTON.

For Biological Assistants, see D. S. KIRKHAM, *Plant Pathology and* K. S. MCKINLAY, *Entomology Sections.*

Assistants (Scientific):

Miss V. M. DREW.
P. ABERY.

Scottish Raspberry Investigation: *Headquarters—University College, Dundee.*

R. V. HARRIS,* *Head of Investigations.*
C. H. CADMAN, B.Sc.(Liv.), Ph.D.(Edin.),† *Plant Pathologist. (In charge.)*
C. A. WOOD, Ph.D.(Wales),† *Pomologist.*
A. R. HILL, Ph.D.(St. Andrews),† *Entomologist. (Resigned September,* 1949.)
R. J. ROSE.†

Assistants (Scientific):

R. W. REID.†
H. A. BISSETT.†
P. H. RACIONZER.†

Clerical Assistant:

Mrs. A. S. COULL,† *Part-time.*

Scientific Liaison: H. B. S. MONTGOMERY, B.A.(Dublin), Ph.D.(Lond.), D.I.C.
A. C. PAINTER, O.B.E.
J. H. WALKER, B.Sc.Agric.(Reading).

Assistant (Scientific):

Miss S. D. J. HUMPHREYS.

Instructress in Fruit Growing to the Kent Education Committee stationed at East Malling Research Station: Vacant.

Meteorological Records: A. P. PRESTON.
G. F. TROWELL.

Librarian: S. R. BALL, B.A.(Lond.), F.L.A.

Photographer: E. YOXALL JONES.

FARM STAFF.

Farm Supervisor: F. H. VILLIERS, M.Sc.Agric.Econ., B.Sc.Agric.(Reading), N.D.A.

Assistant Plantations Officer: Miss B. F. SEYMOUR.

Experimental Nurseries: T. V. DIXON.

Experimental Greenhouses: A. TIDY.
Miss E. K. JOYCE. (*Resigned September,* 1949.)

Workshops: G. WELLER.
K. W. G. BUNYARD. *Laboratory Instrument Mechanic.* (*Appointed February*, 1949.)

Farm Clerk: A. J. SPILLER.

ADMINISTRATION.

Secretary: C. T. ROYLE, M.C.

Book-keeper: P. R. WOOD.

Director's Personal Secretary: Miss L. M. READ.

Clerical Staff: Miss J. M. COY, Miss M. E. EMM, Miss L. MIDGLEY, Miss J. D. MARTIN, Miss J. M. PARSONS, Miss L. SHERRATT, Miss D. G. HUME (*Resigned June*, 1949), Miss P. M. RAYFIELD, Miss R. M. WICKHAM, Miss I. CROSS, Mrs. F. J. FITNESS, Miss D. M. ANSELL, Miss M. E. WEDGBURY, Miss J. M. NOAKES (*Resigned August*, 1949), Miss P. H. WESTACOTT, Miss D. A. JESSUP, Miss M. V. RELF (*Appointed July*, 1949).

VISITORS.

Tours of the Station are arranged by appointment on Tuesday and Thursday afternoons. Visitors with special interests are received by appointment on the mornings of these days and may then join the general tour later if they wish. Wednesdays and Fridays are reserved for visiting research workers who also should make an appointment to ensure that a useful programme for the visit can be prepared.

All visitors wishing to see the work of the Station should go to the Enquiry Office at the Research Laboratories.

Visitors coming by road should take the turning to East Malling, opposite "The Bull", Larkfield, on the main London-Maidstone road. The entrance gate to the Research Station is on the left, opposite the "King and Queen" in East Malling.

Bus Service: From Maidstone by the Maidstone and District Motor Services Limited, every 20 minutes from Maidstone to East Malling.

Passenger Station: EAST MALLING HALT (British Railways Southern Region).

Goods Station: AYLESFORD (British Railways Southern Region).

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THE COMMONWEALTH BUREAU OF HORTICULTURE AND PLANTATION CROPS

Accommodated at Bradbourne, the Administrative Headquarters of the East Malling Research Station.

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Consultant Director: F. R. TUBBS, M.Sc.(Lond.), Ph.D.(Lond.), D.I.C., A.R.C.S., F.L.S. (*Appointed July*, 1949.)

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Assistants: H. WORMALD, D.Sc.(Lond.), A.R.C.S., D.I.C.
V. H. GOLDSCHMIDT, Ph.D.
Miss P. J. ROWE-DUTTON, B.Sc.(Hort.). (*Appointed January*, 1949.)

Clerical Staff: Miss M. B. ROGERS, Miss M. M. DURLING, Miss J. E. MORRISON.

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Fruit Specialist Officer, South Eastern Province: W. G. KENT, N.D.H.

Clerical Assistant: Mrs. D. B. DUPUY.

GENERAL DEVELOPMENT AND ACTIVITIES

Introductory.

In presenting this Thirty-seventh Report on the general development and activities of the Station, the Executive Committee would draw attention to two changes. Formerly issued as a supplement to the Annual Research Report, this will in future be termed the Administrative Report, while both Reports will cover the academic year 1st October to 30th September, instead of the calendar year. Thus the Reports will now cover the same period as the Station's financial year and should be available some months earlier than has been usual in the years since the war. For this reason the present Report only covers the nine months period up to the end of September, 1949, except for the statement of finance which refers to the full year as formerly.

In July, the Committee extended a warm welcome to the new Director, Dr. F. R. Tubbs, whose appointment is recorded below. He comes to East Malling at a time when many problems consequent upon rapid growth and post-war conditions, some of them of long standing, await solution. We are confident that he will be equal to the task that lies ahead of him.

It was a source of special gratification to the Committee to find that so many have taken occasion to honour and show their appreciation of the great qualities and long service of our late Director, R. G. Hatton, on his retirement. The highlight of the year, indeed, has been the conferment of a Knighthood on him by H.M. The King in July.

The year has seen further additions to the research staff, and the Committee, who have for several years endeavoured to ease the problem of staff housing, now face the urgent need for increased accommodation in the laboratories.

In commenting on the satisfactory financial return shown by the Experimental Farm in 1948, it was emphasized that, if the land was to be used to the full for its proper purpose, credit balances could not continue to be shown for very long. In 1949, despite another heavy crop, a somewhat reduced acreage of cropping fruit, the serious effect of the long drought on fruit size and quality and the drop in market prices all combined to produce a deficit in the Farm account.

Appointment of Director.

At the beginning of the New Year, Mr. T. N. Hoblyn was appointed Acting Director for the interim period pending the appointment of a successor to Sir Ronald Hatton. In the meantime a special Selection Committee was set up to consider applications and recommend an appointment. At an Emergency Meeting in April, the Executive Committee duly approved the appointment of Dr. F. R. Tubbs, M.Sc., D.I.C., A.R.C.S., F.L.S., as from 1st July. Dr. Tubbs is no stranger to East Malling, having spent six months in the Physiology Section in 1929 before proceeding to Ceylon to found a Department of Plant Physiology at the Tea Research Institute of Ceylon. Dr. and Mrs. Tubbs have the good wishes of Committee and staff alike for a happy and successful life among us.

Sir Ronald Hatton.

In the Research Report for 1948, we were able to add a postscript briefly recording the inclusion of the name of our late Director in the list of Knights Bachelor in H.M. The King's Birthday Honours. This event was celebrated by a general half-holiday for the Cricket Match, Staff *v.* Members, on 30th June, at the start of which Sir Ronald opened the new Bradbourne Cricket Ground. A few weeks later, at the Annual Commemoration, Sir Ronald was admitted to a Fellowship of his old College at Wye, of which he had been a Governor since 1944.

In the meantime Members of the East Malling Association and other friends had conspired to show their admiration and affection for Sir Ronald and Lady Hatton in a practical form, and in May we were able to hand them a substantial cheque towards the purchase of a house at Hythe, to which they moved from Fircroft in August. In due course, a bound and suitably inscribed list of subscribers will also be presented to them. Details of a presentation from the staff and postgraduate students are given later in this Report.

Lastly, the Committee and staff were represented at a pleasant gathering at Bradbourne in September, when Sir Ronald and Lady Hatton were presented with an inscribed bowl by Mr. H. Turner, Chairman of the New Zealand Fruitgrowers' Federation, as a token of their esteem.

Obituary.

We regret to report the death of Mr. J. A. Raynham of Dairy Farm, Marden, who was one of the original Members of the Committee of Management, formed in 1920 to establish the East Malling Research Station. He was one of the representatives of the National Farmers' Union on the Governing Body until his retirement in 1945, serving on the Executive Committee until 1936.

We also record with regret the death of Mr. Percy Chambers of Shepway Court, Maidstone, who had been a Member of our Hop Sub-Committee for many years.

Governing Members.

No changes have taken place in the membership of the Governing Body.

Committees.

In addition to the Emergency Meeting mentioned above, the *Executive Committee* (Chairman, Mr. T. Neame), and the *Finance Sub-Committee* (Chairman, Mr. J. W. S. Mount) held their usual quarterly meetings. The *Postgraduate and Staff Sub-Committee* (Chairman, Professor V. H. Blackman) met in March to advise the Acting Director concerning staff recommendations in the Station's annual estimates to the Ministry of Agriculture. At the first meeting of the newly-constituted *Building and Staff Accommodation Sub-Committee* in May, Mr. J. F. Towner was elected Chairman. In accepting office, Mr. Towner referred appreciatively to the long and valuable service of Mr. W. Talbot Edmonds as Chairman of the Building Sub-Committee. At the same meeting a report was received from the small *Ad hoc* Sub-Committee appointed to recommend a suitable residence for Dr. Tubbs. The *Plant Prices Sub-Committee* (Chairman, Mr. W. T. Edmonds) held its usual meeting in July to decide on plant prices for the coming season. The following are the more important matters dealt with by the Committees during the period under review.

Laboratory Accommodation.

Last year we referred briefly to the increasing congestion in our laboratories and the need for a long-term building programme designed to meet the needs of the growing research staff in years ahead. The completion of the new staff canteen enabled the old kitchen and staff dining room in the E.M.B. building to be vacated just after the end of the period of this Report. Plans have been drawn up for the conversion of the kitchen into an organic chemistry laboratory and the dining room is to be used by workers in all Sections for reading and writing, undisturbed by the many distractions in our overcrowded laboratories. In the other buildings, plans have been made for the rearrangement of some of the rooms to make the best use of existing space. Estimates of the cost of these alterations and certain urgently needed equipment have been submitted to the Ministry of Agriculture, whose sanction is now awaited.

These measures can at best be only a temporary alleviation and any further expansion of staff or additions to the very few postgraduate students we can now accept must await the provision of new buildings. With this in view, a long-term building programme was prepared by Dr. E. E. Cheesman in which provision is made not only for increased laboratory space, but also for the expanding needs of the Commonwealth Bureau and the Library. This programme was approved and has been submitted to the Agricultural Research Council. The Committee hope that it may be possible to implement at least some of the proposals in the near future.

Experimental Greenhouses.

Much of the programme of the Pathology Section in the coming year depends upon the completion of at least part of the new glasshouses, especially designed and equipped for research on virus diseases, in the spring of 1950. The plans, drawn up in consultation with Mr. J. E. Temple, Consulting Engineer, were finally approved by the Agricultural Research Council and Treasury sanction obtained for an expenditure of £18,000 early in the year. As we write, we may add that building operations are now going ahead and that every effort is being made for at least one of the houses to be available for next season's work.

Staff Accommodation.

In last year's Report we indicated that there were still difficulties to be overcome before a start could be made on the eight houses for members of the research staff to be built adjacent to East Malling village ; indeed it was not before the autumn that the foundations of the first pair of houses were laid. Building is now going slowly ahead, but owing to the shortage of building labour, it seems unlikely that any of the houses will be ready before next summer.

" The Grange " has amply proved its worth as a hostel for single members of staff and postgraduates during the year. Under the management of Mr. and Mrs. Parker, appointed in April, the hostel has settled down very satisfactorily and has been full throughout the year.

The Sub-Committee appointed to house the Director, after inspecting various properties in the neighbourhood and consulting Dr. Tubbs, recommended that Park Farm House, Bradbourne, hitherto occupied by the arable farm foreman, should be completely reconditioned for his use. Although the work was put in hand at once, it was not until the late autumn that Dr. and Mrs. Tubbs were able to take possession of the house.

In order to provide accommodation for a further worker on the experimental farm, two cottages in East Malling, one with vacant possession, were purchased.

The Bradbourne Lake.

During the winter months the lake at Bradbourne, which had been drained several years ago, and settling ponds were cleaned out and the island at the west end built up at varying levels for use in propagation experiments for which water tables at different depths are needed. The verges of the lake were then made good where necessary and the lake refilled. Some work still remains to be done to provide overhead irrigation on the island, the soil of which has been allowed to settle for a year before experimental work can begin. When completed, the island will be a most valuable asset to our work, while the refilling of the lake and resowing of the old lawns, ploughed up for food crops during the war, have greatly added to the amenities of Bradbourne.

Mount Memorial Gates.

The new entrance to Bradbourne, designed by Mr. L. Mason Apps, A.R.I.B.A., embodying the wrought iron gates erected to the memory of our late Chairman, Mr. Spencer W. Mount, was completed in the summer and the annual Governing Members' day was made the occasion of their formal opening by Sir Ronald Hatton. The Committee were gratified that Mrs. S. W. Mount, members of her family and old friends of our late Chairman were able to be present. The new entrance is a fitting memorial to his untiring efforts for the good of the Station.

Staff Salaries.

Although the assimilation of research staff and assistants (scientific) into their new salary grades has now been completed, in September details of the new grades for the administrative staff were still awaited. The Committee are extremely concerned at the long delay in effecting improvements in the administrative staff salaries ; they value very much the patience and loyalty of those most nearly concerned.

Repairs to Buildings.

In addition to the laboratories, administrative and farm buildings, the Station now owns a large number of houses and farm cottages and the workshop staff have been kept fully occupied. Permanent support for the floor of the Judge's Room has now been provided on the advice of our Architect and the Advisory Architect of the S.P.A.B. Two rooms at Bradbourne have been redecorated and equipped as offices. Apart from this, it is hoped to make a start during the coming year on the interior repair and decoration of Bradbourne as a whole, which had to be postponed when the house was taken over at the beginning of 1940.

THE ANNUAL GENERAL MEETING.

The Annual General Meeting was held at Bradbourne on the morning of Tuesday, 27th September, 1949, under the Chairmanship of Mr. T. Neame.

Mr. Neame welcomed Dr. F. R. Tubbs as Director of the Station.

Dr. Tubbs, in presenting the Annual Reports, referred to the honour conferred on Sir Ronald Hatton by H.M. The King in recognition of his services to horticulture, and

also to the presentations recently made to him on behalf of British and of New Zealand Growers. He also expressed the great indebtedness of the Station and of the staff to Mr. T. N. Hoblyn, and also Dr. E. E. Cheesman, for their invaluable work during the months of Sir Ronald's illness in 1948 and after his retirement.

Dr. Tubbs surveyed the administrative and research reports which would be available for circulation at an early date.

On the proposition of Professor Blackman, seconded by Mr. R. D. Wickham, the Annual Reports for 1948 were adopted.

The Balance Sheet and Accounts for the year ending 30th September, 1948, were presented by the Finance Chairman, Mr. J. W. S. Mount. He commented on the satisfactory condition of both the Research and Farm Accounts, the latter showing surplus of £3,245. On the proposition of Mr. G. E. Tuker, seconded by Mr. L. J. Cook, the Balance Sheet and Accounts were unanimously adopted.

The re-election of the auditors, Messrs. J. Dix Lewis, Caesar Duncan & Co. for the ensuing year was unanimously confirmed.

A programme was arranged for the Governing Members in the afternoon, and in this they were joined by Fellows who attended the Annual Meeting. Demonstrations were given of work on rootstock-scion incompatibilities and of methods of overcoming certain of these in the field, spraying to control fruit-drop, fruit sampling as an aid to recording, suspected virus diseases of tree fruits, and a new method of separating the organic compounds occurring in plants, paper chromatography, which already was giving most interesting results.

FINANCE.

The following summary of the Expenditure and Receipts of the Research, Special Grants and Experimental Farm Accounts covers as usual a full year, from 1st October, 1948, to 30th September, 1949. A further large increase in the grant from the Ministry is consequent on recent improvements in staff salaries and additions to the research staff. Members will note particularly the contribution from the East Malling Association and the credit balance of £3,245 from the Experimental Farm in the previous year 1947-48. Of the Special Grants from the Agricultural Research Council, that for the Scottish Raspberry Investigation is still the most substantial.

On the Experimental Farm, improved wage rates have resulted in an increase of £3,000 in Farm wages. During the year a new D2 Caterpillar Tractor and other implements have cost some £2,060 ; the item of repairs to buildings includes part of the cost of reconditioning Park Farm House.

Proceeds of the sale of produce and crops amounted to £9,000 less than in last year. Part of this reduction was a result of grubbing fruit trees no longer of experimental value ; but the fruit crop as a whole was a large one and the main part of the reduction must be attributed to the effect of the prolonged drought on fruit size and the substantial fall in fruit prices in 1949.

This accounts for the deficit of £6,692 on the year's working. Just as previously credit balances have been carried forward to the Research Account in the following year, so the Ministry of Agriculture, under the terms of our agreement, will now meet the deficit.

The grant of £1,413 for the Irrigation Scheme refers to the work of clearing Bradbourne lake and rebuilding the island for propagation experiments. Part was put out to contract and the remainder carried out by our own farm labour.

Research Account.

1st October, 1948, to 30th September, 1949.

Expenditure.	£	s.	d.	Income.	£	s.	d.
Salaries, National Insurance and Superannuation ..	61,564	1	8	Grant from Ministry of Agriculture	70,795	5	11
Laboratory Expenses and Equipment	4,020	6	2	Balance of Plantation Account 1947-48	3,245	1	0
General Maintenance Expenses	8,550	16	6	Contribution from Public Bodies	50	0	0
Frost Damage Investigations ..	1,251	16	2	Contribution from East Malling Association	1,507	0	0
Hop Propagation Expenses ..	75	0	0	Sundry Receipts	647	18	5
	75,462	0	6				
Balance, being excess of Income over Expenditure	783	4	10				
	£76,245	5	4		£76,245	5	4

Supplementary Accounts.

Special Grants from the Agricultural Research Council.

Expenditure.	£	s.	d.	Income.	£	s.	d.
Biennial Bearing in Fruit Trees Investigations	472	19	0	Balance brought forward, 30th September, 1948	101	14	6
Raspberry Investigations in Scotland	5,053	14	1	Biennial Bearing in Fruit Trees Investigations	494	0	0
Hop Propagation Experiments	54	10	10	Raspberry Investigations in Scotland	5,646	0	0
Mineral Deficiency Investigations	113	6	8	Raspberry Cane Midge Investigations (Balance)	395	13	6
Pettar Ace Red Spider Investigations	1,490	19	5	Mineral Deficiency Investigations	113	6	8
				Pettar Ace Red Spider Investgations	292	1	6
				Balance carried forward ..	142	13	10
	£7,185	10	0		£7,185	10	0

Experimental Farm Account.

1st October, 1948, to 30th September, 1949.

Expenditure.	£	s.	d.	Income.	£	s.	d.
Farm Wages	28,313	18	6	Sale of Produce and Crops ..	35,994	4	11
Farm Manures and Sprays ..	2,872	3	4	Grant for Irrigation Scheme (Bradbourne Lake)	1,412	19	11
Irrigation Scheme (Bradbourne Lake)	922	8	0	Sundry Receipts	1,762	6	8
General Farm Expenses, Implements and Repairs ..	13,753	1	3	Balance being Excess of Expenditure over Income ..	6,691	19	7
	£45,861	11	1		£45,861	11	1

The East Malling Association.

There has been a further small increase in the number of Fellows and Members of the Association, bringing the total to 2,005 at the end of September. We cannot emphasize sufficiently how much we value the continued support of the Station's work

by our Members. The contributions are themselves of great value, partly to the research and largely to the staff housing and amenities ; but most of all we look to our Association to maintain our personal contacts with the world of professional and amateur growers of fruit. To-day, we have fewer opportunities of visiting our Members on their own holdings, since advisory work is no longer our province, and we look forward to our Open Days as occasions on which to renew old friendships and make new ones. Frequently growers can give us information vital to our research out of their own experience and, as has happened many times this season, such information has enabled our research workers to go straight to the heart of a trouble and has helped them enormously. For this reason the Committee would urge Members to do all in their power to increase our membership during the coming year.

In the statement of accounts below the details have been rearranged to show the position more clearly than in previous Reports. An Income and Expenditure Account for the year is now given separately from the assets of the Association in the form of investments and property. The chief items of expenditure in 1949 were the grant of £1,508 towards research and the purchase of two houses in Maidstone to meet a very urgent need to accommodate two married members of the research staff. We would also mention a much appreciated grant of £250 towards the social and athletic activities of the staff. The year's expenditure has thus left us with a deficiency of £1,970 ; this, however, is amply covered by the investments and properties held by the Association, detailed below. Fircroft, Larkfield, previously occupied free of rent by Sir Ronald Hatton, has now been let at an agreed rent to another member of the research staff. The Rentals Account shows the rents received, expenditure on repairs, etc.

The East Malling Association Income and Expenditure Account.

1st October, 1948, to 30th September, 1949.

Expenditure.	£	s.	d.	Income.	£	s.	d.
Research Grants	1,508	11	6	Cash at Bank, 30th September, 1948	911	6	9
General Expenses	533	18	10	Subscriptions and Donations during year	4,209	5	6
Staff Recreation	250	0	0	Sale of Leaflets	3	1	10
Sundry Grants	78	12	7	Interest on Investments ..	143	0	0
Purchase of Property :				Bank Overdraft	1,970	16	0
31 Buckland Lane, Maidstone	2,567	1	2				
59 Grace Avenue, Maidstone	2,299	6	0				
	£7,237	10	1		£7,237	10	1

Investments and Freehold Properties held by the Association at 30th September, 1949.

	£	s.	d.	£	s.	d.
Investments at Cost :						
£2,000—2½% National War Bonds, 1949-51				2,000	0	0
£3,720—2½% Consols				3,000	0	0
Freehold Properties at Cost :						
" Fircroft ", Larkfield	2,577	16	5			
" Grange ", East Malling	6,214	17	2			
31 Buckland Lane, Maidstone	2,567	1	2			
59 Grace Avenue, Maidstone	2,299	6	0			
				13,659	0	9
				£18,659	0	9

Association Rentals Account.

1st October, 1948, to 30th September, 1949.

Expenditure.	£ s. d.	Income.	£ s. d.
To Rates, Schedule "A" Tax, Repairs, etc.	77 10 7	Cash at Bank, 30th September, 1948	48 3 2
Cash at Bank, 30th September, 1949..	105 1 0	Rents received during year ..	134 8 5
	£182 11 7		£182 11 7

Members' Days.

Two Members' Days were held during the nine months under review, but it was not feasible to include a day on gage plums as provisionally planned, owing to various circumstances chiefly connected with the very abnormal weather during the whole season.

The meeting on 22nd March was arranged to show Members the lines along which the research on frost damage and its prevention were proceeding, with particular reference to the methods and apparatus used for studying the effect of low temperatures on various fruit blossoms. Members of staff of the Fuel Research Station at Greenwich, who are working on the problem of warming orchard areas, described their problem, with illustrations, and discussed the progress they were making towards its solution. Working models and exhibits completed the programme. The attendance numbered some 220 Members and was a strain on the accommodation available, especially as some did not signify their intention of being present.

The meeting on 6th July took the form of a Cherry Day and provided Members with an opportunity of going over the cherry variety collection at the Station with Mr. N. H. Grubb before his retirement at the close of the season. The weather was ideal and about 150 Members attended.

The Governing Members paid a special visit on 27th June to see and discuss certain lines of work under development. The programme in the morning dealt with cover crops and some of the new trials on the light soil of Larkfield Plantations were examined. In the afternoon the subjects were the influence of growth substances on the process of abscission, especially as a means of preventing "June drop" and pre-harvest fruit-drop, and methods for the field testing and application of fungicides.

"Amos" Memorial Fund.

The "Amos" Memorial Fund was founded to commemorate the late Mr. Jesse Amos, a valued and well-loved member of the staff from 1913 to 1945. Subscriptions to the Fund, amounting to £456 4s. 6d., have now been received, a sum that is nearing the original target figure of £500. It is hoped that further donations will allow of this sum being reached.

The fund is administered by a Committee consisting of the Chairman, the Director, the Staff Representative and the Secretary. The interest accruing is used to meet the expenses of a Memorial Lecture, which it is hoped to hold annually. Members of the East Malling Association are invited to attend, a Members' Day usually being arranged to coincide with the Lecture.

Mr. B. S. Furneaux has been invited to deliver the second "Amos" Memorial

Lecture on 18th October at Bradbourne, his subject being " The Soil and the Fruit Tree ".

STAFF.

The Staff Council met as usual prior to the quarterly Executive Committee meetings. In September they re-elected Dr. W. G. Keyworth as their representative on the Governing Body.

At the end of September, after thirty-two years' service in the Pomology Section, Mr. N. H. Grubb retired. Earlier in the year we welcomed the publication of his Monograph on Cherries, which result of his long and intimate study is likely to be a standard work on this fruit for many years to come. We are glad to report that Mr. Grubb is not finally severing his connection with the Station and will continue, at any rate for the next year, to assist with the raspberry breeding programme on a part-time basis.

At the end of the year also, Dr. E. E. Cheesman resigned to take up a new post as Scientific Assistant to the Secretary of the Agricultural Research Council. Our contacts with the Council are now so close, however, that we are able to look forward to seeing him frequently at the Station, where he has made so many friends. Dr. Tubbs will now take over the supervision of our plant breeding activities within the Pomology Section.

We congratulate Dr. A. B. Beakbane on the award of the Jones Bateman Cup by the Royal Horticultural Society in recognition of her contributions to our knowledge of horticultural science.

In order to assist in the studies of frost damage, Miss N. Wallick was appointed as a special temporary assistant in April.

The year 1949 has seen the winding up of our cultural studies of hops and transfer of the work to the new Hop Research Institute at Wye College. These studies have for more than twenty years been in the charge of Mr. F. H. Beard, who now returns to the College, from which he came to East Malling in 1926, to continue the work. We wish him every happiness and success in his new post ; his presence at Wye will be yet another of the ties between the two Institutes and we expect to see him often in future.

We congratulate Mr. J. Taylor on being one of the first two candidates to be awarded the newly-instituted Diploma of the Royal Statistical Society.

It is with pleasure that we welcomed during the year under review three new members of Professor F. G. Gregory's staff working at East Malling. Mr. C. R. Hancock, who first came to East Malling in 1947 as a postgraduate student, has now been appointed to the staff of the Research Institute of Plant Physiology to undertake work on hormone survey and vegetative propagation. At the same time, Mr. F. W. M. Llewelyn was appointed to undertake research on spray damage to fruit trees. Mr. H. C. Ruck was appointed to the post of assistant to Dr. Bolas, resigned by Mr. G. B. Portsmouth to take up a post at the Tea Research Institute, Ceylon, at the end of 1948.

In the Biochemistry Section we welcomed Dr. A. E. Flood in March as assistant to Dr. Bradfield, to work in collaboration with the Pathology Section on the chemical aspects of bacterial canker of stone fruits. Dr. Flood's previous experience with Professor E. L. Hirst at Manchester University will be of particular value in this work.

There have been several changes in the Plant Pathology Section during the year. The resignation of Dr. Prentice in October was reported last year ; it is with pleasure that we now record his marriage to Miss M. M. Hitchcock in February. We wish them every happiness and shall miss them both.

In August, we extended a warm welcome to Mr. A. F. Posnette, formerly of the West African Cacao Research Institute, Tafo, Gold Coast, who has been seconded from the Colonial Service to take up Dr. Prentice's work on virus diseases, particularly of tree fruits. Mr. Posnette's work on the Swollen Shoot disease of Cacao is well known and, in the short period he has been with us, he has already made us conscious that we must take into serious consideration the possible effects of virus diseases in the tree fruits with which we are working.

In March, Mr. P. C. R. Webb resigned to accept a post as mycologist with the Shell Refining and Marketing Co., and in April, Mr. J. E. Crosse was appointed as mycologist and bacteriologist to the Section in his place. In the following month, the Agricultural Research Council agreed to the temporary appointment of Dr. A. Kozlowski, formerly Professor of Horticulture at Poznan University, Poland, for work on soil-borne diseases.

In May also, Miss P. M. Goode joined the Section as assistant for hop disease investigations to fill the post vacated by Miss Hitchcock. At the end of the year Miss T. M. Woollcombe, who had been working at East Malling on raspberry diseases in collaboration with our Scottish team, resigned to take up duties at home and was replaced by another of our former plantation assistants, Mr. R. Cropley.

In the Entomology Section, Mr. F. Cronk resigned in March.

We congratulate Dr. A. H. M. Kirby, Head of the Plant Protective Chemistry Section, on the award of a Ph.D. degree by London University for a thesis on work carried out at Glasgow before his appointment here, and also on his election as Associate of the Royal Institute of Chemistry. Problems of penetration of insecticides, ovicides and fungicides and the related problem of synergistic action are now being examined, for which studies Mr. M. Allen joined the Section as physical chemist in July.

Lastly, among the senior research staff we were sorry to say "goodbye" to Dr. A. R. Hill, entomologist to the Scottish Raspberry team, who left to take up an academic post in September.

Among the assistant (scientific) staff, A. E. H. Rutter (Pomology) left in July to go to Cambridge University. The Cricket Club, in particular, will watch his University career with interest. Also in the Pomology Section, Mrs. O. Wenbourne and Miss J. Hayward resigned, Miss S. J. Cogger was appointed in February, Miss E. Ironmonger in April and D. Hooper in July. Miss V. V. Fry joined the Statistics Section as computor in May ; R. W. Love was appointed to the Physiology Section in September. J. H. Larking (Imperial College) was called up for Military Service in February, and B. Barrett and W. R. Marchant joined in April and October respectively. Miss S. Lloyd (Biochemistry) came in September and Miss H. May (Entomology) in June. Miss E. K. Joyce resigned from the greenhouse staff in September. Routine duties in connection with the greenhouses will in future be carried out by members of the farm staff.

Again there have been no changes in the senior administrative staff. Each year recently in these notes it has been the Committee's pleasure to record their appreciation of the devoted work of Mr. Royle and his staff. The assistance given to the Acting Director during the interval between Sir Ronald Hatton's resignation and the appointment of the new Director, and to the latter on his arrival, has been particularly valuable and we thank them again. As we write we are glad to add that there is a prospect in the near future of providing the much needed reinforcement alluded to last year.

Among the clerical staff Miss D. G. Hume resigned in June, and Miss J. M. Noakes in August. Miss M. V. Relf was appointed in July.

On taking up his appointment as Director of the Station, Dr. Tubbs was invited to succeed Sir Ronald Hatton as Consultant Director of the Commonwealth Bureau of Horticulture ; apart from this there have been no changes in the Bureau staff.

Although the Committees do not meet very frequently during each year, a great deal of unobtrusive work is put in by the officers of the Library (Chairman, Mr. Akenhead), Greenhouse (Chairman, Dr. Massee), Workshops (Chairman, Mr. Villiers) and Photographic Studio (Chairman, Dr. Montgomery) Committees, and we once again thank them for their help.

It was not until the end of September that we were able to move into the new Staff Canteen. We should like to thank the members of the Advisory Committee, particularly the Chairman, Mr. A. G. G. Hill, and the Secretary, Miss D. J. Wilson, for their very valuable help before and during the changeover.

Social and Athletic Activities.

The staff have greatly valued the gesture of the East Malling Association in making a grant of £250 for the year towards social and athletic activities. This grant has enabled several Clubs newly-formed or in abeyance during the war years to get on their feet. At the same time, a portion of the sum is being placed in reserve towards a sports pavilion which we hope to erect at Bradbourne before very long.

The Christmas party was again held at Bradbourne on two consecutive nights in January. A very successful variety entertainment ended up with community singing and was much enjoyed by all.

The outstanding social event of the year was the opening of the new Bradbourne Sports Ground, followed by the Annual Cricket Match against the Members' XI on 30th June. Sir Ronald Hatton opened the ground by bowling the first ball to Mr. R. D. Wickham, Captain of the Members' team. The very close match ended in a draw.

Later in the summer Sir Ronald and Lady Hatton gave a farewell party to all the staff at Bradbourne. After tea, a cheque was presented to them by Mr. N. H. Grubb and Mr. C. Bates, the senior members of the research and farm staffs, on behalf of 270 present and past members of staff and postgraduate students. An inscribed volume containing the signatures of all who contributed is being prepared. We understand that the sum will be expended on a greenhouse for the new garden at Hythe, in which we hope Sir Ronald will spend many happy hours.

Apart from the Members' Match the Cricket Club played five inter-staff games and nineteen matches ; thirty-eight players taking part in these games. Two Club dances were held during the season. Plans for 1950 include several matches against other Research Institutes, including revivals of the two traditional fixtures against Wye College staff and R.H.S. Gardens, Wisley.

The tennis courts were in much better playing condition this year and a temporary windbreak of hop lewing made play much easier in windy weather. The Tennis Club had a successful season, winning five of the six matches played.

In its second season, the Table Tennis Club has also prospered, Club nights being very popular. Twelve matches were played against local teams.

The second Annual Produce Show of the Garden Club was held in September. The Show was opened by Lady Hatton, and Sir Ronald, assisted by Mr. W. G. Kent and Mrs. Tydeman, judged the exhibits. A new and successful departure was an annual outing to the gardens of Lympne Place by kind permission of Lady Haldin.

Since January, five meetings of the Play Reading Society have been held, one of

which was out-of-doors in June. In the same period the Gramophone Club gave three concerts. With new amplifying equipment they are looking forward to an expansion of our musical activities in the coming winter. The Orchestral Society hopes, with the arrival of some newcomers, to get going again shortly.

The Chess Club now has twelve members and met six times.

Last year we recorded our appreciation of the kind thought that had prompted members of the Irrigation Research Station, Griffith, New South Wales, to send us all food parcels. These parcels have continued to arrive throughout the year and some 177 members of the staff have now benefited. It was a particular pleasure to us, therefore, to welcome a visit from Mr. R. F. Williams of Griffith, who brought with him a beautiful colour film describing the work of his Institute, and to thank at least one member of the Griffith staff personally for their kindness.

Candidates for Higher Degrees.

We have to congratulate two members of the present research staff on the award of higher degrees by London University. In March, Mr. M. H. Moore was awarded the degree of Ph.D. for a thesis entitled " Studies in the infection of hardy fruit trees by pathogens in relation to the development of control measures " ; and, in August, Mr. R. S. Pitcher was also awarded a Ph.D. degree for a thesis entitled " On the biology of Gall Midges of the Genus *Thomasiniana* Strand, E.1916 ".

We also congratulate Dr. I. W. Prentice on the award of an M.Sc. degree by London University in March for a thesis entitled " Resolution of strawberry virus complexes ". This work was done at East Malling before Dr. Prentice left for Harpenden in October, 1948.

At the end of the year, two postgraduate students and nine members of the research staff were registered as Internal Students of London University for higher degrees. One member of the Imperial College staff was also registered.

Short Term Students and Voluntary Workers.

Again, owing to overcrowding in our laboratories, we were forced to limit severely the number of students whom we could accept.

Mr. Bjarne Ljones of Vollebekk, Norway, spent six months in the Pomology Section assisting with the work on plant breeding and field recording.

The Statistics Section had help from two students, each for a period of a month, Mr. A. R. Khalil from Farouk University, Alexandria, Egypt, in June, and Mr. B. T. Warner of University College, London, in July.

Mr. P. C. Holliday spent a month in the Pathology Section, at the request of the Colonial Office, before proceeding to a post at Trinidad under the Cocoa Research Scheme. Mr. J. S. Wilson, experimental assistant at Messrs. Guinness's Hop Farm, and Mr. W. A. Hughes, Plant Pathologist, Gold Coast, also worked in the Pathology Section, both for periods of about three weeks in September. Others who stayed with us for short periods were Mr. W. J. Woodman (University College) and Mr. T. Visser (Wageningen, Holland) in the Pomology Section ; Miss S. Pybus (Holloway College) in the Biochemistry Section ; Miss E. J. Scott (Imperial College) in the Physiology Section ; and Mr. Francis (University College, Southampton) at the Entomology Section's Field Laboratory in Essex.

In September Mr. Werner Schwarzenbach arrived for a six months' stay with the Pomology Section.

Lastly, we cannot close this section of the Report without mentioning Mrs. D. M. Swithinbank, who has again given us valuable help throughout the year.

Plantation Assistants.

Interest in this scheme has been well maintained and we always have a waiting list.

The general work on the Experimental Farm has proceeded on similar lines to previous years and present and past assistants have expressed their gratitude to members of the research staff who have volunteered to give them lectures during the winter months.

Opportunities have been found for plantation assistants to visit various shows and an expedition to the Plant Protection Field Research Station at Fernhurst was organized.

Three entrants for the N.D.H. Preliminary Examination held by the R.H.S. were all successful.

Of those who completed their course since January, Miss G. Couch is now in charge of the Bradbourne Gardens and R. Cropley has been appointed to the Pathology Section. D. A. Jones is a student gardener at the Royal Botanic Gardens, Kew, and J. Harvey and A. L. Foster are working in commercial horticulture.

Staff Discussions.

Eight Staff Discussions, covering a wide range of subjects, were held during the months of January to March.

The specialist topics included " The application of insecticides and fungicides ", " Some recent ideas on plot lay-out ", "Hop virus diseases", and " Plant Breeding at East Malling ". In addition, interesting accounts were given by Mr. H. M. Tydeman and Dr. E. E. Cheesman of their research tours in Scandinavia and the Malay Peninsula respectively. On another occasion, members of the staff of the Bureau of Horticulture and Plantation Crops gave an account of their work.

An especially valuable and stimulating discussion was held on 24th February. This was arranged with the object of encouraging our fruitgrower members to express their ideas of the present and future needs of the industry from research and to discuss those ideas with us. Some thirty growers and others directly interested in fruitgrowing accepted our invitation to attend. Five of these, Messrs. J. W. S. Mount, C. Norbury, C. Howard Jones, E. W. Gaskain and S. R. Dixon, gave us short papers each of which led to an interesting discussion, which afterwards became general. We look forward to similar occasions later on.

Research Tours.

Several members of the research staff were enabled to make visits abroad, mostly with the aid of grants from the Ministry of Agriculture.

In July, Dr. A. E. Bradfield, accompanied by Dr. W. G. Keyworth, visited Zurich to discuss with Professor Gäumann and his collaborators, at the Swiss Federal Technical Institute, their work on the wilt toxin, lycomarasmin, which is produced by the fungus *Fusarium bulbigenum var. lycopersici* when grown in culture.

From Zurich, Dr. Keyworth travelled to Prague where he was joined by Mr. J. Paine for a visit to the Zatec (Saaz) hop growing district of Czechoslovakia to study research in progress on hop virus diseases and cultural methods.

In May, Dr. E. S. J. Hatcher and Mr. R. J. Garner made a tour in Holland to study work on propagation, including work on controlled water tables, and official certification schemes. Twelve Research Stations and other Institutes were visited.

By arrangement with the Station de Recherches, Versailles, and the Comité Régional d'Arboriculture fruitiéres, Major S. G. Thompson made a tour in France during the summer, mainly to study the incidence of mineral deficiencies and French methods for the control of iron deficiency.

At the invitation of the Spanish Agricultural Research authorities, Dr. W. A. Roach spent three weeks in the summer in Madrid visiting the Consejo Superior de Investigaciones Cientificas and the University City of Madrid, and in diagnosing mineral deficiencies in fruit and other crops in the surrounding country.

Dr. W. S. Rogers and Mr. N. H. Grubb both paid short visits to the Wädenswil Research Station, Switzerland, the former in February to discuss work on frost, and the latter in July to discuss cherry varieties and culture with Dr. Kobel.

At home, Dr. R. V. Harris made a tour of raspberry growing districts in Norfolk in late August ; Dr. Keyworth and Mr. Paine visited the West Midland hop growing area in July.

COLLABORATION.

The number of enterprises in which we collaborate with other Research Institutes, Advisory Services and fruitgrowers continue to multiply ; readers of this Report may note particularly several new lines in which we have the benefit of collaboration with members of the Rothamsted and Long Ashton staffs.

Perhaps the most important development this year is the initiation of the new National Fruit Trials at the Mereworth Station, five miles from East Malling. As noted elsewhere, the staff is well represented on the Committees relating to this which have already been set up and, although it will be some years yet before very much of the area is planted up with fruit, we anticipate that almost all Sections will find much to interest them in these trials eventually.

Following on Sir William Ogg's visit last year, a party visited Rothamsted for a round table discussion of East Malling's soil problems. This exchange of views will be most helpful in drawing up our future programme.

With regard to the application of the results of our work to the industry, we would draw particular attention to arrangements for the large-scale propagation of small fruits and hops and the various certification schemes of the Ministry of Agriculture and the Scottish Department of Agriculture, in which the advice of members of the Pathology and Pomology Sections has been often sought and freely given. While the Station cannot undertake responsibility for the organization and administration of schemes to provide the fruitgrower with disease-free, true-to-name plants in bulk, our participation in them seems essential; and even though much of the work can no longer be strictly termed research, we feel that the time and energy expended will be well repaid by the ultimate benefit to the Nation's fruit supply.

The Pomology Section have co-operated with the Department of Agriculture, Oxford, by undertaking preliminary trials of weedkillers in orchards. In the sewage-sludge trials, started at the instance of the A.R.C. a few years ago, members of the Section have had help from Rothamsted in the technique of making straw-sludge compost and in the analysis of samples, both of sludge and composts. Samples of black-currant leaves from this trial at East Malling were sent to Long Ashton for analysis and comparison with leaves from a similar trial there.

Collaboration with workers at the Fuel Research Station, Greenwich, in frost damage research has continued ; in March, they and the National Institute of Agricultural Engineering, Wrest Park, took part in and provided demonstrations for a Frost Conference here.

The Section have collaborated with the N.A.A.S. in a cover crop trial at Cranbrook and helped prepare a film strip on the same subject ; they also assisted the Nitrate Corporation of Chili Ltd., in planning a manurial trial. They would again thank Mr. J. O. Jones of the N.A.A.S., in particular, for carrying out analyses of soil samples.

Samples of fruit for research purposes have been supplied to various workers and the storage quality of Tydeman's Late Orange apple has been tested at Ditton Laboratory.

A study of variability in plantation Cacao has been undertaken by the Statistics Section, in collaboration with Mr. T. A. Russell of Agodi, Nigeria. Advice of design and interpretation of field experiments has been given to N.A.A.S. Officers, the Essex Institute of Agriculture and Wye College.

As indicated under " Staff ", the collaboration of our Physiology Section with the Research Institute of Plant Physiology, Imperial College of Science, has not in any way diminished. A noteworthy addition is the new work on spray damage now being undertaken. As a result of the visit of Dr. Hatcher and Mr. Garner to the Netherlands, arrangements are being made for joint work with Dr. Jacobi of the Nursery Research Station, Boskoop, on the rooting of stem cuttings. The effects of picking date and growth substance spray on storage quality of fruits are being investigated with the help of the Ditton Laboratory. With the N.A.A.S., an experiment on propagation of gooseberry cuttings has been initiated.

With the help of the A.R.C., arrangements have been made for collaboration with Messrs. Metropolitan Vickers Ltd., in research on the use of the mass spectrometer for mineral analyses of plants, and Dr. Vanstone of the Biochemistry Section has visited Mr. J. Blears at Manchester in this connection during the year. Numerous workers from overseas have consulted the Section about mineral deficiency problems.

Intensified research on virus diseases of tree fruits has now been undertaken by our Pathology Section, and in this we have had the collaboration of workers at Long Ashton. We were also greatly assisted by Dr. R. S. Willison of the Dominion Laboratory of Plant Pathology, St. Catherine's, Ontario, an authority on these diseases, who is spending this year at Long Ashton. The Section also collaborated with N.A.A.S. officers in Kent in observations and a field experiment on Rubus Stunt and virus diseases of strawberry and, particularly with the Botley Station, on Black Root Rot of Strawberry. Experiments on incidence of Brown Rot in apple have been undertaken with the N.A.A.S. East Sussex. Collaborative research with Long Ashton on atomized fungicide concentrations has also been started.

The A.R.C.-Pettar-Ace Red Spider Investigations in Essex have now continued for six seasons. This undertaking may well be cited as an outstanding example of successful collaboration between research workers, manufacturers and fruitgrowers. We would again thank all concerned, especially the Essex Institute of Agriculture, for the many facilities placed at our disposal.

Apart from the above, the Entomology Section would specially like to acknowledge the interest and help received from Dr. T. Goodey and members of the Nematology Department at Rothamsted in the development of their strawberry eelworm research programme. In this connection, we have to thank also Miss K. H. Johnstone of Truro, Mr. R. D. Reid of Auchincruive, Mr. L. N. Staniland of Bristol and various growers.

Also at Rothamsted, Dr. H. F. Barnes has collaborated in researches on Gall Midges of fruit.

Once more Drs. A. B. Page and O. Lubatti of the Imperial College of Science have helped us in studies in the control of Tarsonemid Mite by methyl bromide ; the Section has further had the collaboration of Messrs. Pest Control Ltd. and of N.A.A.S. officers in an experiment in the control of the Strawberry Aphid by means of a systemic insecticide.

The Plant Protective Chemistry Section are also closely interested in the Essex Red Spider Investigations and, for these, as well as for other purposes, they have been supplied with chemicals and other materials through the good offices of the A.R.C. Sub-Committee on Organo-Phosphorus Compounds and the Inter-departmental Committee on Insecticides and several commercial firms. They are also indebted to the Chemical Research Laboratory, Teddington, for preparing copper cuprosulphite for field tests. Mr. K. S. McKinlay was enabled to make a study visit to Rothamsted, through the courtesy of Dr. C. Potter.

Finally, we must mention once again our Scottish Raspberry Investigation, still with its headquarters in the Biology Department of University College, Dundee, and its many contacts throughout Scotland. This year we would refer particularly to the co-operation of Dr. J. C. Hunter of the Macauley Institute, Aberdeen, in work on the relation of manurial treatment to virus disease expression and flower bud production ; also to the testing for virus content of certain strawberry clones of Auchincruive Climax and other varieties with Mr. R. D. Reid of Auchincruive. During the summer, in co-operation with the New Zealand Department of Agriculture and Mr. J. P. Hudson of the University of Nottingham, a scheme was drawn up embodying methods of importing raspberry canes in bulk from the Dominion.

As in many years past, we would say once again how much we value the collaborative aspects of our work and the goodwill of those co-operating with us.

Outside Trials.

Permission and facilities to carry out a trial in a grower's plantation are only another form of collaboration. For this reason the division between this and the previous section is always rather arbitrary. Such trials usually include a proportion of " control " plots, while in others a treatment may even prove harmful. To the grower who nonetheless allows us to carry on we are the most grateful, while he himself is evidently making a personal contribution to research for the benefit of the Industry as a whole. Some of these trials, such as those on our Chairman's farms, are now of long standing and are all the more valuable.

Trials not previously mentioned in this Report, conducted by the Pomology Section, include a cover cropping experiment on Messrs. Chivers' farms at Histon, and a small-scale herbicide trial on stoolbeds at Ditton Court Nurseries.

On Mr. J. W. S. Mount's farm the Biochemistry Section have a trial on mineral deficiency in apples and plums.

The Pathology Section have many observation plots all over Kent, notably in connection with cherry virus diseases, apple mosaic, hop virus diseases and Verticillium Wilt. Without such disinterested help progress would be much retarded. A spraying trial of new fungicides for the control of Scab is in progress at Ulcombe and detailed trials of manurial effects on hop Nettlehead resistance at Bodiam.

In addition to the eight farms in Essex where the Entomology and Plant Protective

Chemistry Sections enjoy facilities for Red Spider research, the former Section has two spraying trials against Strawberry Aphid at Ramsgate and Adisham. Two farms at Lingfield and Addington, Surrey, have again given facilities for work on Raspberry Cane Midge control.

Again at Ditton Court, the Plant Protective Chemistry Section has an extensive trial on the control of Apple Sawfly.

Lastly, the Scottish Raspberry Investigation team has to thank ten growers at Kinneff, Kirkmichael, Glamis, Glenisla, Kinloch Rannoch, Auchterarder, Montrose and Blairgowrie for experimental facilities; and four growers at Forfar, Cupar, Lanark and Kirriemuir for land for trials of new raspberry seedlings. This list alone reveals the widespread nature of this research and the support from Scottish growers it is receiving.

Again we take the opportunity to say " thank you " to all those who are helping us.

Committee Work and Conferences.

Individual members of staff served on forty-six different outside committees covering many aspects of research, advice and education in relation to horticulture. Of special interest during the past year has been the formation of several committees to develop the new site for the National Fruit Trials at Mereworth, Kent, on one of which, the Advisory Committee, the Director serves and on another, the Clearance Sub-Committee, Mr. T. N. Hoblyn and Dr. W. A. Roach serve.

The Station has been well represented at conferences of fellow scientists, advisers and fruitgrowers throughout the country, in many cases reading papers or joining in the discussions. Dr. M. H. Moore acted as Secretary for the Fungicides Section of the Second International Congress of Crop Protection in London, and papers on growth regulating substances were read at this Congress by Drs. E. S. J. Hatcher and M. C. Vyvyan. The Station was also represented at the First International Congress of Biochemistry at Cambridge.

Advisory Work.

Correspondence.

The number of advisory letters received by the Station has shown a considerable reduction, nearly 500 letters, on last year's total, doubtless due to the greater use now being made of the official advisory services. The Scientific Liaison Section dealt with some 1,500 letters, subsequently passing the correspondence on to the appropriate advisory officer in the case of some 200 of these. In addition about 250 were referred direct to the advisory services. The research staff personally replied to some 800 letters. As shown below, the reduction in the number of letters has been offset by a big increase in visitors, so that the work of the Liaison Section has by no means decreased.

Telephone enquiries for advice appear to have been almost as numerous as last year, those recorded by the Scientific Liaison Section amounting to 750. No record is available of the many calls dealt with by the research sections.

Visits.

Visits paid during the year amounted to 247, and were mainly related to research in progress on raspberries in Scotland, hop diseases and fruit tree red spider mite. In certain cases joint visits with the appropriate advisory officer were made.

Exhibits.

Certain aspects of the work of the Station were displayed at sixteen horticultural shows, mainly in the South Eastern Counties, in several cases in collaboration with the respective county staff. The exhibit at Chelsea Flower Show made suggestions for a minimum spray programme to control the chief pests and diseases found in fruit gardens. Other subjects dealt with at shows included a spray programme for commercial fruit, planning the small fruit garden, selected apple varieties and new seedling apples, Malling raspberry varieties, and points to watch in exhibiting plates of fruit. From time to time Mr. Tydeman staged exhibits at the Royal Horticultural Society's fortnightly shows of new fruits of promise that he had raised. An exhibit of the work of the Scottish Raspberry Investigation was staged at the Royal Highland and Agricultural Society's Show at Dundee in June.

Visitors.

Visitors during the full year amounted to 3,247. This was a big increase on last year and during the spring and summer months a certain number of requests for visits had to be refused in spite of receiving parties on Saturday afternoons. In all 72 parties, totalling 2,230 people, were shown round and of these 6 were from overseas, as follows : Students from Versailles, South African farmers, Belgian horticulturists, Dutch advisory officers, Danish advisory officers and a party from the International Congress of Crop Protection, for which special demonstrations were staged.

It was a special pleasure to welcome a party of Directors and Headquarters staff of the Commonwealth Agricultural Bureaux, who paid a visit both to the Bureau and the Station in June. Other parties from home included fruitgrowers from Gloucester and East Suffolk, the Institute of Corn and Agricultural Merchants, the Lindley Society, Advisory Mycologists and a large gathering of the R.H.S. Fruit Group.

Individual visitors numbered 845, of whom some 300 were from overseas, not only from all parts of the Commonwealth and the U.S.A., but also from all parts of Europe, China, Chile, Argentine, Palestine, Lebanon and Liberia.

Attendances at Members' Days, not included in the above figures, amounted to 578.

The series of classes in fruitgrowing for Kent school teachers lapsed during the year owing to the resignation of the instructress accommodated at the Station and the fact that the Kent Education Committee have not yet filled the vacancy.

Attention is drawn to the revised arrangements for visitors, detailed on page 9 of this Report.

Lectures and Demonstrations.

Thirty lectures have been given by members of staff ; the most important were to large conferences of fruitgrowers in Maidstone, Canterbury, Fareham (Hants.), Pershore, Reading and Hereford, and to advisory officers at Long Ashton, London and Sutton Bonington. A lecture on walnuts was given by Miss E. M. Glenn to the summer school of the Men of the Trees at Exeter. Dr. C. H. Cadman gave seven lectures in various parts of the country on horticulture in New Zealand. Dr. Roach lectured on mineral deficiencies to the Consejo Superior de Investigaciones Cientificas in Madrid.

In addition, two lectures on entomology to students at the Essex Institute of Agriculture at Writtle were given by Mr. M. D. Austin, and a series of six lectures on statistical methods in agricultural experiments to students at Wye College by Mr. S. C. Pearce.

Apart from demonstrations to visitors to the Research Station, only two demonstrations were organized, both concerning the work of the Scottish Raspberry Investigation and both in July, one at West Park Hall, Dundee, and the other at Slatefield, Forfar.

Refresher courses were held at the Station for N.A.A.S. officers who were to undertake the inspection and certification of fruit tree rootstocks and hops.

Several members of staff have been serving as judges at the chief commercial and amateur fruit shows in Kent and London.

Distribution of Rootstocks and Experimental Material.

Stoolbeds.

A further 2½ acres of stoolbeds of commercial rootstocks were grubbed in January, 1949, pursuing the policy outlined last year. We have now approximately 8 acres in full production. Part of the 7-acre stoolbed, which includes the new apple rootstocks resistant to Woolly Aphis, was planted up during the winter 1948-49.

Season.

As this Report only covers the period up to the end of September, we cannot give the usual figures of nursery production and it is early days to report how the exceptionally dry season has affected rooting. Aphis and red spider have not been so troublesome, but the lack of available soil moisture for the young growing material may have more serious effects.

However, the take in the cutting beds of soft fruits has been good, though the crop of bedded stocks was much affected, and, when compared with last season's excellent crop, the mortality was heavier, and the grades reduced. Some lined-out quinces were also affected.

The use of a machine for stock planting, which still requires perfecting, has also probably been responsible for some losses among the bedded stocks. However, it is anticipated that this will be rectified and the new machine, together with the German plough now used for lifting the crop, will make a material saving in time and labour costs.

An unusual phenomenon occurred in the grafted material during the exceptionally hot Easter week-end, 16th-19th April, when the temperature went above 70° F., 80° F. being registered on 18th April. The hot weather seemed to cause an excess of sap which pressed up the grafting wax on top of the grafted stocks to such an extent that, when finger pressure was applied, the wax burst, spraying sap in all directions ; on stocks where the wax had already burst, the flow of sap was obvious on the stock itself and the ground around. Later inspection indicated that in such cases the scions had commenced to rot, and a high proportion of failures was expected. However, the majority, after existing for up to two months, gradually grew away into average sized trees without any apparent detrimental effect.

Pests and Diseases.

These have been of small importance, the most widespread being the Woolly Aphis (*Eriosoma lanigerum.* Hanson) on scion varieties and Apple Mildew (*Podosphaera leucotricha* (Ell. and Everh.) Salm.) on the stocks.

Bud and Graftwood and New Varieties.

Except in very exceptional circumstances for research purposes, the Station does not undertake to supply budwood and little has been sent out this season. Graftwood of *Tydeman's Late Orange* apple, for which there is a considerable demand, is to be sent out for the first time to Members in the coming winter. The new late blackcurrant variety, *Amos Black*, is also being released for propagation purposes only, but the supply is insufficient to allow of all the very many requests we have had for bushes being met.

STATION'S PUBLICATIONS.

A full list of publications during the year appears in Part II of the Research Report, which summarizes the work and main published papers of each Section; in all 43 scientific papers and 34 more popular bulletins were published. Much assistance has been given to the Royal Horticultural Society in the preparation of a new publication "The Fruit Garden Displayed", and close collaboration maintained with the N.A.A.S. in the preparation and revision of the official fruit bulletins and leaflets.

Journal of Horticultural Science.

Volume XXIV, Nos. 3 and 4, which were due to appear in December, 1948, actually came out in July, 1949, so that much remains to be done in getting back to the plan of one volume completed in each calendar year. By the end of September, however, enough manuscript had been received for Volume XXV and if the flow is maintained it may be possible to complete Volume XXVI by December, 1950.

Contributions from sources other than Long Ashton and East Malling have increased to such an extent that they will constitute more than half of Volume XXV.

LIBRARY COMMITTEE.

The outstanding venture of the year has been the investment in a microfilm reader, which should prove of great value in making available scarce material from the U.S.A. and other countries; theses are an example, the originals of which are often not printed and are, therefore, unobtainable in normal form. Microfilm offers a convenient method of acquisition and storage of such material.

Among additions to the library one of the most important has been a long set of the *Transactions of the British Mycological Society* from Volume VII, 1921-22, to date. This essential journal was one of the more important of those with direct bearing on the Station's work not hitherto represented in the library.

Many extremely useful and welcome donations have been made during the year. Sir Ronald Hatton presented to the library a generous allocation from his collection of journals and pamphlets, largely consisting of early material which is very difficult to obtain or even borrow. The British National Book Centre has been most helpful in securing for the library several good runs of early volumes of periodicals such as *Nature*, *British Chemical Abstracts*, *Journal of the Chemical Society*, *Philippine Journal of Science*, and others. Twenty-three volumes of the *Journal of the Society of Chemical Industry* were presented by the City Librarian of Glasgow, and two early volumes of the *Entomologist* by the Library of the National Museum of Wales. Among gifts of books should be noted a handsome copy of *Arthur William Gould's History of the Worshipful*